

The documentation and process conversion measures necessary to comply with this revision shall be completed by 13 April 1999.

INCH-POUND

MIL-PRF-19500/477C
13 January 1999
SUPERSEDING
MIL-S-19500/477B
12 June 1982

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, FAST RECOVERY, POWER RECTIFIER,
TYPES 1N5802, 1N5804, 1N5806, 1N5807, 1N5809, AND 1N5811,
1N5802US, 1N5804US, 1N5806US, 1N5807US, 1N5809US, AND 1N5811US
JAN, JANTX, JANTXV, JANJ, JANS, JANHC, AND JANKC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for silicon, fast recovery, power rectifier diodes. Five levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Two level of product assurance are provided for each unencapsulated device type.

1.2 Physical dimensions. See figures 1 through 8.

1.3 Maximum ratings. Unless otherwise specified, $T_A = +25^\circ\text{C}$.

1.3.1 Ratings applicable to all Part or Identifying Numbers (PIN).

$T_{STG} = -65^\circ\text{C}$ to $+175^\circ\text{C}$.

$T_{op} = -65^\circ\text{C}$ to $+175^\circ\text{C}$.

$T_{J(max)} = +175^\circ\text{C}$.

1.3.2 Ratings applicable to individual types.

| Types | V_{RWM} | I_{O1} $T_L = +75^\circ\text{C}$ $L = .375"$ (9.52 mm) <u>1/</u> | I_{O2} $T_A = +55^\circ\text{C}$ <u>2/</u> | I_{FSM} at $+25^\circ\text{C}$ Operating at I_{O2} $t_p = 8.3$ ms | t_{rr} | $R_{\theta JL}$ at $L = .375"$ (9.52 mm) | $R_{\theta JEC}$ <u>3/</u> |
|------------------|-----------|---|--|---|----------|---|-------------------------------|
| 1N5802, 1N5802US | 50 | 2.5 A <u>4/</u> | 1.0 A <u>5/</u> | 35 A(pk) | 25 ns | 36°C/W | 20°C/W |
| 1N5804, 1N5804US | 100 | 2.5 A <u>4/</u> | 1.0 A <u>5/</u> | 35 A(pk) | 25 ns | 36°C/W | 20°C/W |
| 1N5806, 1N5806US | 150 | 2.5 A <u>4/</u> | 1.0 A <u>5/</u> | 35 A(pk) | 25 ns | 36°C/W | 20°C/W |
| 1N5807, 1N5807US | 50 | 6.0 A <u>6/</u> | 3.0 A <u>7/</u> | 125 A(pk) | 30 ns | 22°C/W | 10°C/W |
| 1N5809, 1N5809US | 100 | 6.0 A <u>6/</u> | 3.0 A <u>7/</u> | 125 A(pk) | 30 ns | 22°C/W | 10°C/W |
| 1N5811, 1N5811US | 150 | 6.0 A <u>6/</u> | 3.0 A <u>7/</u> | 125 A(pk) | 30 ns | 22°C/W | 10°C/W |

1/ $T_{EC} = T_L$ at $L = 0$ or $T_{end\ cap}$ for US suffix devices.

2/ This rating is typical for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where T_{op} and $T_{J(max)}$ in paragraph 1.3 are not exceeded.

3/ US suffix devices only.

4/ Derate at $25\text{ mA}/^\circ\text{C}$ for T_L above $+75^\circ\text{C}$.

5/ Derate at $8.33\text{ mA}/^\circ\text{C}$ for T_A above $+55^\circ\text{C}$.

6/ Derate at $60\text{ mA}/^\circ\text{C}$ for T_L above $+75^\circ\text{C}$.

7/ Derate at $25\text{ mA}/^\circ\text{C}$ for T_A above $+55^\circ\text{C}$.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAT, 3990 East Broad St., Columbus, OH 43216-5000, by using the addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

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FSC 5961

MIL-PRF-19500/477C

1.4 Primary electrical characteristics. Unless otherwise specified, $T_A = +25^\circ\text{C}$.

| Types | V_{BR} | I_{R1} at $V_R = V_{RWM}$ $T_A = +25^\circ\text{C}$ | I_{R2} at $V_R = V_{RWM}$ $T_A = +100^\circ\text{C}$ |
|------------------|----------|--|---|
| | (V dc) | $\mu\text{A dc}$ | $\mu\text{A dc}$ |
| 1N5802, 1N5802US | 60 | 1.0 | 50 |
| 1N5804, 1N5804US | 110 | 1.0 | 50 |
| 1N5806, 1N5806US | 160 | 1.0 | 50 |
| 1N5807, 1N5807US | 60 | 5.0 | 150 |
| 1N5809, 1N5809US | 110 | 5.0 | 150 |
| 1N5811, 1N5811US | 160 | 5.0 | 150 |

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

MILITARY

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARDS

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Defense Printing Service Detachment Office, Building 4D (Customer Service), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Associated specification. The individual item requirements shall be in accordance with MIL-PRF-19500 and as specified herein.

3.2 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500 and as follows:

V_{fr} Forward recovery voltage.

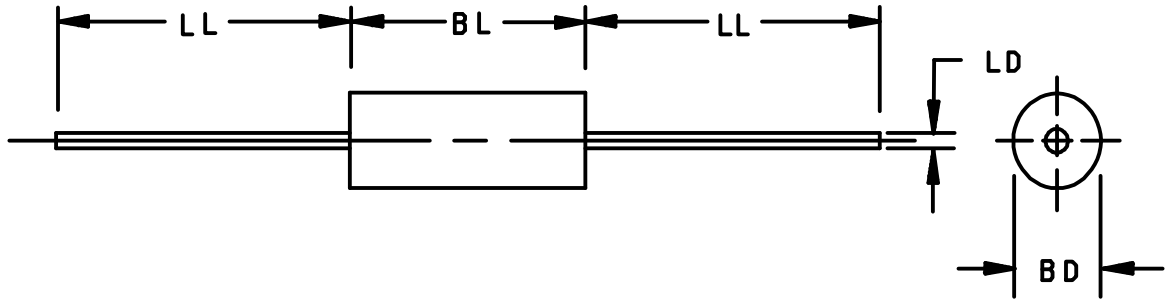
$I_{(BR)}$ Current for testing breakdown voltage.

3.3 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500, and figures 1 through 8 herein.

3.3.1 Diode construction. These devices shall be constructed utilizing non-cavity double plug construction with high temperature metallurgical bonding between both sides of the silicon die and terminal pins (see MIL-PRF-19500). Metallurgical bond shall be in accordance with the requirements of category I in MIL-PRF-19500. US version devices shall be structurally identical to the non-surface mount devices except for lead terminations.

3.3.2 Lead finish. Lead finish shall be solderable as defined in MIL-PRF-19500, MIL-STD-750, and herein.

3.4 Marking. Devices shall be marked as specified in MIL-PRF-19500.

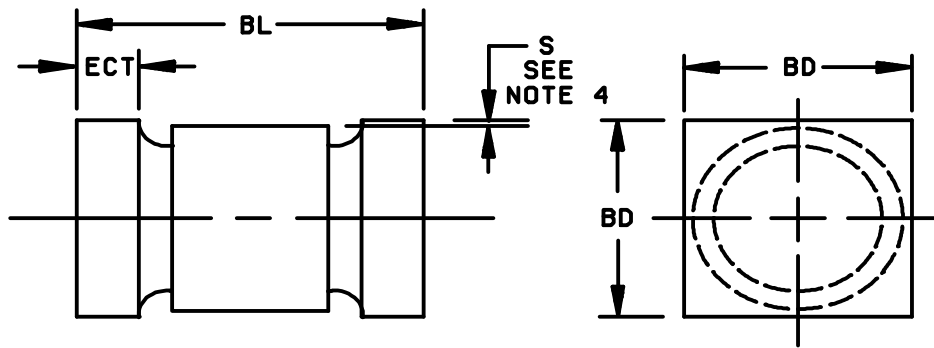


| Ltr. | Dimensions | | | | | | | | Notes |
|------|------------------------|------|-------------|-------|------------------------|------|-------------|-------|-------|
| | 1N5802, 1N5804, 1N5806 | | | | 1N5807, 1N5809, 1N5811 | | | | |
| | Inches | | Millimeters | | Inches | | Millimeters | | |
| | Min | Max | Min | Max | Min | Max | Min | Max | |
| BD | .065 | .085 | 1.65 | 2.16 | .115 | .165 | 2.92 | 4.19 | 4 |
| BL | .125 | .250 | 3.18 | 6.35 | .130 | .300 | 3.30 | 7.62 | 3 |
| LD | .027 | .032 | 0.69 | 0.81 | .037 | .042 | 0.94 | 1.07 | 3 |
| LL | .700 | 1.30 | 17.78 | 33.02 | .900 | 1.30 | 22.86 | 33.02 | |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension LD shall include the sections of the lead over which the diameter is uncontrolled. This uncontrolled area is defined as the zone between the edge of the diode body and extending .050 inch (1.27 mm) onto the leads.
4. Dimension BD shall be measured at the largest diameter.
5. In accordance with ANSI Y14.5M, diameters are equivalent to ϕ x symbology.

FIGURE 1. Physical dimensions.

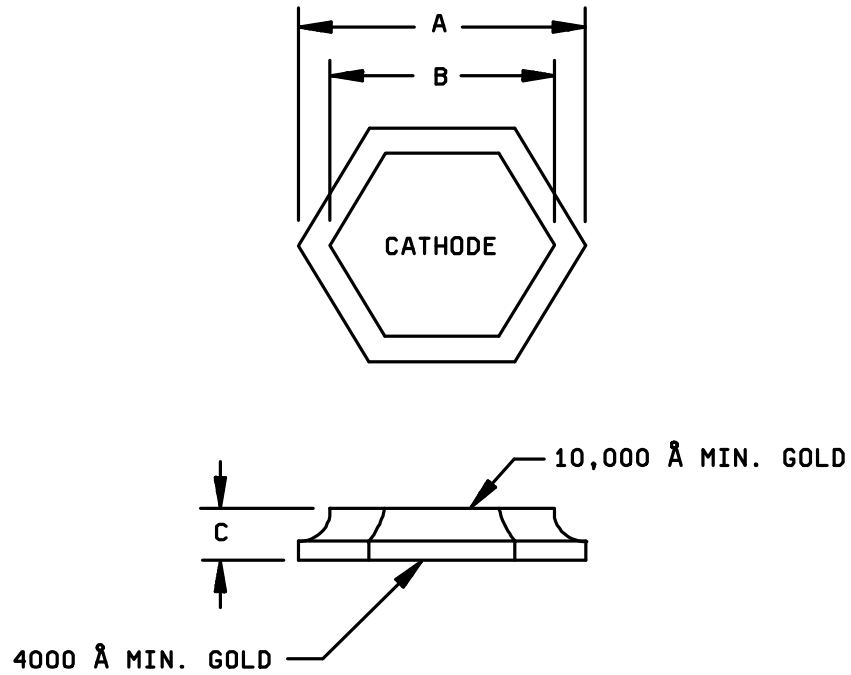


| Ltr. | Dimensions | | | | | | | | Notes |
|------|--------------------------------------|------|-------------|------|--------------------------------------|------|-------------|------|-------|
| | D-5A 1N5802US, 1N5804US, 1N5806US | | | | D-5B 1N5807US, 1N5809US, 1N5811US | | | | |
| | Inches | | Millimeters | | Inches | | Millimeters | | |
| | Min | Max | Min | Max | Min | Max | Min | Max | |
| BD | .091 | .103 | 2.31 | 2.62 | .137 | .148 | 3.48 | 3.76 | |
| BL | .168 | .200 | 4.27 | 5.08 | .200 | .225 | 5.08 | 5.72 | |
| ECT | .019 | .028 | 0.48 | 0.71 | .019 | .028 | 0.48 | 0.71 | |
| S | .003 | | 0.80 | | .003 | | 0.80 | | |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Gap not controlled, shape of body and gap not controlled.
4. Dimensions are pre-solder dip.
5. Cathode marking to be either in color band, three dots spaced equally, or a color dot on the face of the end cap.
6. Color dots will be .020 inch (0.51 mm) diameter minimum and those on the face of the end cap shall not lie within .020 inch (0.51 mm) of the mounting surface.
7. In accordance with ANSI Y14.5M, diameters are equivalent to ϕ x symbology.

FIGURE 2. Physical dimensions of surface mount family.

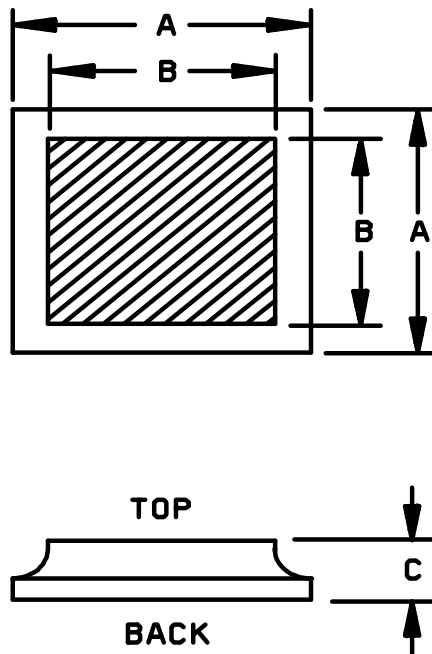


| Ltr. | Dimensions | | | | | | | | Notes |
|------|------------------------|------|-------------|------|------------------------|------|-------------|------|-------|
| | 1N5802, 1N5804, 1N5806 | | | | 1N5807, 1N5809, 1N5811 | | | | |
| | Inches | | Millimeters | | Inches | | Millimeters | | |
| | Min | Max | Min | Max | Min | Max | Min | Max | |
| A | .047 | .053 | 1.19 | 1.35 | .085 | .091 | 2.16 | 2.31 | |
| B | .033 | .037 | 0.84 | 0.94 | .072 | .076 | 1.83 | 1.93 | |
| C | .007 | .011 | 0.18 | 0.28 | .007 | .011 | 0.18 | 0.28 | |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 3. JANNC (A-version) die dimensions.



| Ltr. | Dimensions | | | | | | | | Notes |
|------|------------------------|------|-------------|------|------------------------|------|-------------|------|-------|
| | 1N5802, 1N5804, 1N5806 | | | | 1N5807, 1N5809, 1N5811 | | | | |
| | Inches | | Millimeters | | Inches | | Millimeters | | |
| | Min | Max | Min | Max | Min | Max | Min | Max | |
| A | .031 | .037 | 0.79 | 0.94 | .062 | .068 | 1.57 | 1.73 | |
| B | .017 | .023 | 0.43 | 0.58 | .050 | .056 | 1.27 | 1.42 | |
| C | .008 | .012 | 0.20 | 0.30 | .008 | .012 | 0.20 | 0.30 | |

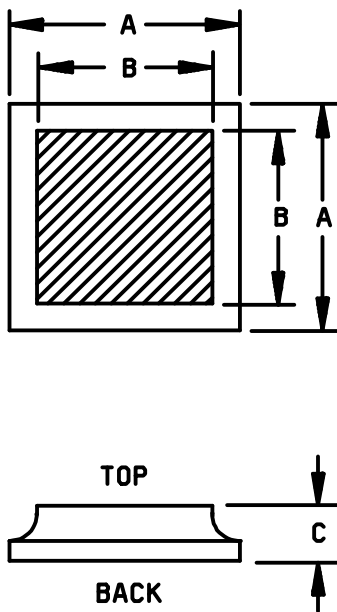
Metallization:

Top: (Anode). Aluminum
 Back (Cathode). Gold

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 4. JANC (B-version) die dimensions.



| Ltr. | Dimensions | | | | | | | | Notes |
|------|------------------------|------|-------------|------|------------------------|------|-------------|------|-------|
| | 1N5802, 1N5804, 1N5806 | | | | 1N5807, 1N5809, 1N5811 | | | | |
| | Inches | | Millimeters | | Inches | | Millimeters | | |
| | Min | Max | Min | Max | Min | Max | Min | Max | |
| A | .031 | .037 | 0.79 | 0.94 | .062 | .068 | 1.57 | 1.73 | |
| B | .017 | .023 | 0.43 | 0.58 | .050 | .056 | 1.27 | 1.42 | |
| C | .008 | .012 | 0.20 | 0.30 | .008 | .012 | 0.20 | 0.30 | |

DESIGN DATA

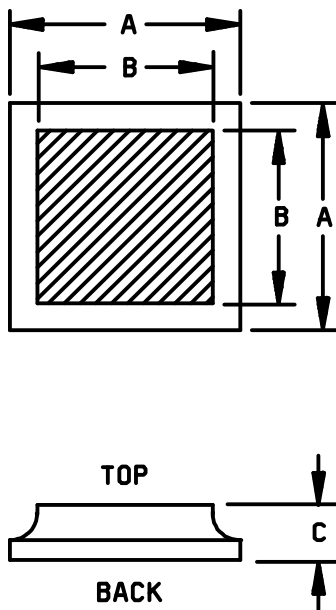
Metallization:

Top: (Anode). Aluminum
 Back (Cathode). Silver

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 5. JANC (C-version) die dimensions.



| Ltr. | Dimensions | | | | | | | | Notes |
|------|------------------------|------|-------------|------|------------------------|------|-------------|------|-------|
| | 1N5802, 1N5804, 1N5806 | | | | 1N5807, 1N5809, 1N5811 | | | | |
| | Inches | | Millimeters | | Inches | | Millimeters | | |
| | Min | Max | Min | Max | Min | Max | Min | Max | |
| A | .031 | .037 | 0.79 | 0.94 | .062 | .068 | 1.57 | 1.73 | |
| B | .017 | .023 | 0.43 | 0.58 | .050 | .056 | 1.27 | 1.42 | |
| C | .008 | .012 | 0.20 | 0.30 | .008 | .012 | 0.20 | 0.30 | |

DESIGN DATA

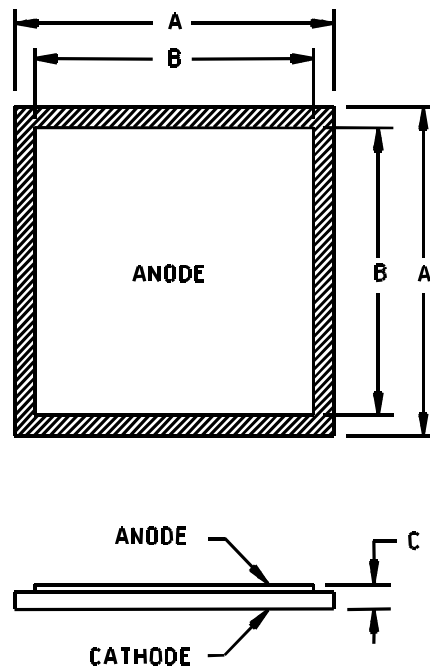
Metallization:

Top: (Anode). Silver
 Back (Cathode). Silver

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 6. JANC (D-version) die dimensions.



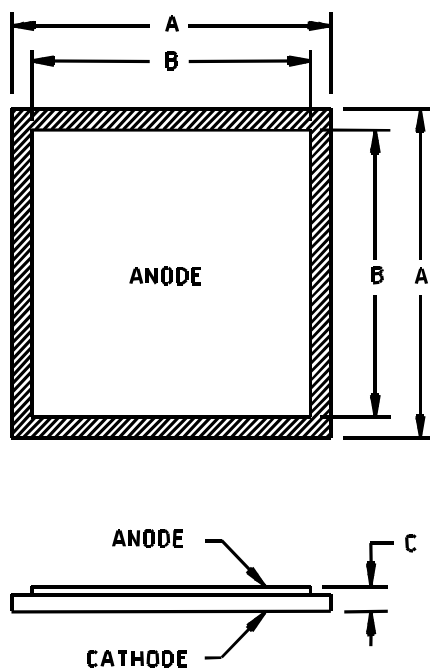
1N5802, 1N5804, 1N5806

| Ltr | Dimensions | | | |
|-----|------------|------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | .039 | .043 | 1.00 | 1.09 |
| B | .031 | .035 | 0.79 | 0.89 |
| C | .008 | .012 | 0.20 | 0.30 |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Anode is aluminum at 45,000 Å minimum.
4. Cathode is gold at 2500 Å minimum.

FIGURE 7. JANC (E-version) die dimensions.



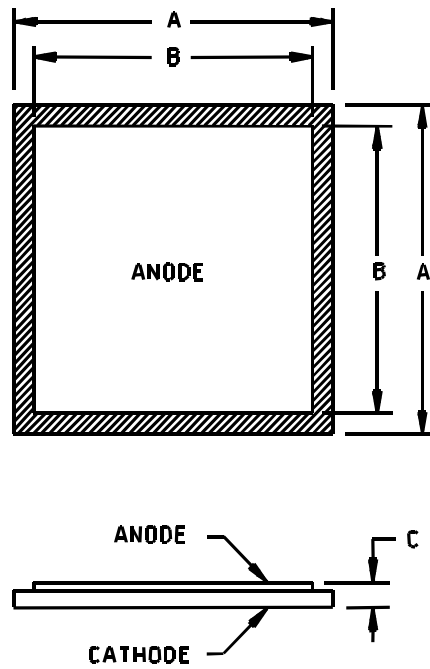
1N5807, 1N5809, 1N5811

| Ltr | Dimensions | | | |
|-----|------------|------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | .066 | .070 | 1.68 | 1.78 |
| B | .057 | .061 | 1.45 | 1.55 |
| C | .008 | .012 | 0.20 | 0.30 |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Anode is aluminum at 60,000 Å minimum.
4. Cathode is gold at 2500 Å minimum.

FIGURE 7. JANC (E-version) die dimensions - Continued.



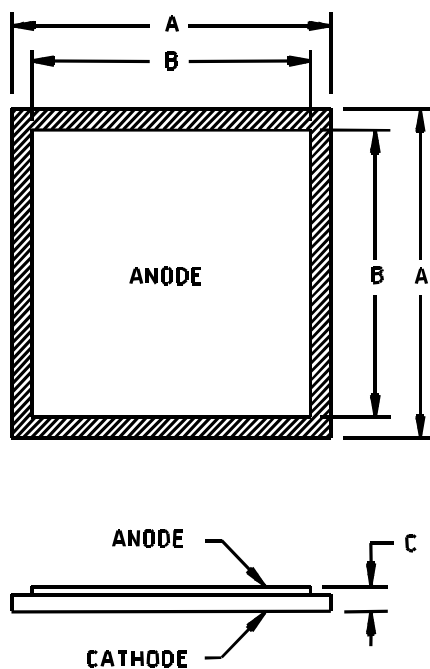
1N5802, 1N5804, 1N5806

| Ltr | Dimensions | | | |
|-----|------------|------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | .039 | .043 | 1.00 | 1.09 |
| B | .031 | .035 | 0.79 | 0.89 |
| C | .008 | .012 | 0.20 | 0.30 |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Anode is aluminum at 45,000 Å minimum.
4. Cathode is silver at 2500 Å minimum.

FIGURE 8. JANC (F-version) die dimensions.



1N5807, 1N5809, 1N5811

| Ltr | Dimensions | | | |
|-----|------------|------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | .066 | .070 | 1.68 | 1.78 |
| B | .057 | .061 | 1.45 | 1.55 |
| C | .008 | .012 | 0.20 | 0.30 |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Anode is aluminum at 60,000 Å minimum.
4. Cathode is silver at 2500 Å minimum.

FIGURE 8. JANC (F-version) die dimensions - Continued.

3.4.1 Marking for US devices. For US version devices only, all marking may be omitted from the device except for the cathode marking. All marking which is omitted from the body of the device shall appear on the label of the initial container.

3.5 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I.

3.6 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3.

3.7 Qualification. Devices furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.2).

4. VERIFICATION

4.1 Classification of Inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3)
- c. Conformance inspection (see 4.4).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500. For JANJ level, see 3.3.1 through 3.3.1.3 of MIL-PRF-19500. Supplier imposed requirements shall be documented in the QM plan and must be submitted to the Qualifying Activity for approval. Radiation characterization may be submitted in the QM plan at the option of the manufacturer.

4.3 Screening (JANS, JANTX, AND JANTXV levels only). Screening shall be in accordance with table IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

| Screen (see table IV of MIL-PRF-19500) | Measurement | |
|--|---|--|
| | JANS level | JANTX and JANTXV levels |
| 1/ ^{1/} | Thermal impedance (see 4.5.3) | Thermal impedance (see 4.5.3) |
| 9 | I_{R1} and V_{FM1} | Not applicable |
| 11 ^{2/} | I_{R1} and V_{FM1} ; $\Delta I_R \pm 100$ percent of initial reading or ± 150 nA dc (1N5802, 1N5804, 1N5806) or ± 500 nA dc (1N5807, 1N5809, 1N5811), whichever is greater. $\Delta V_{FM1} \leq \pm 0.05$ V dc. | I_{R1} and V_{FM1} |
| 12 | See 4.3.1 | See 4.3.1 |
| 13 ^{2/} , ^{3/} | Subgroups 2 and 3 of table I herein; $\Delta I_R \leq 100$ percent of initial reading or ± 150 nA dc (1N5802, 1N5804, 1N5806) or ± 500 nA dc (1N5807, 1N5809, 1N5811), whichever is greater. $\Delta V_{FM1} \leq \pm 0.05$ V dc. Scope-display evaluation (see 4.5.4). | Subgroup 2 of table I herein; $\Delta I_{R1} \pm 100$ percent of initial reading or ± 250 nA dc (1N5802, 1N5804, 1N5806) or ± 1 μ A dc (1N5807, 1N5809, 1N5811), whichever is greater. $\Delta V_{FM1} \leq \pm 0.05$ V dc. Scope-display evaluation (see 4.5.4). |

^{1/} Thermal impedance shall be performed any time after screen 3.

^{2/} Also applies to "US" suffix devices.

^{3/} Except thermal impedance, if already performed.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows:
With the written approval of the qualifying activity and the preparing activity, an alternate burn-in flow may be used (I_O or I_F). A study illustrating equivalence with ACOL testing will be required.

T_A = Room ambient as defined in 4.5 of MIL-STD-750.

$I_O = 1.0$ A (1N5802, 1N5802US, 1N5804, 1N5804US, 1N5806, 1N5806US)

$I_O = 3.0$ A (1N5807, 1N5807US, 1N5809, 1N5809US, 1N5811, 1N5811US)

V_R = rated V_{RWM} (see 1.3.2), $f = 50$ -60 Hz.

4.3.1.1 Alternate mounting conditions (For -US devices only). At the option of the manufacturer, any clips or heat sink mounting configurations may be utilized provided that one of the following conditions be met:

- a. $T_{EC} = +75^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_R = V_{RWM}$ rated, $f = 50\text{-}60$ Hz, $I_O = \text{rated}$ (see 1.3.2).
- b. Temporary attachment of leads or equivalent (thermal properties not to exceed the leaded part) T_J shall not exceed 200°C , $f = 50\text{-}60$ Hz, $T_J = +150^{\circ}\text{C} \pm 25^{\circ}\text{C}$, $I_O = I_{O2(\text{rated})}$, $V_R = V_{RWM}$ rated.

4.3.2 Screening (JANHC and JANKC). Screening of die shall be in accordance with MIL-PRF-19500.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500 and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIa (JANS) and table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with the applicable inspections of table I, group A, subgroup 2 herein except $Z_{\theta JX}$ need not to be performed. See 4.5.2 for delta limits (JANS only).

4.4.2.1 Group B inspection, table VIa (JANS) of MIL-PRF-19500.

| Subgroup | Method | Condition |
|----------|--------------|---|
| 3 | 4066 | $I_{FSM} = \text{rated}$ (see 1.3); 10 surges of 8.3 ms each at 1 minute intervals, superimposed on $I_O = I_{O2}$ rated (see 1.3); $V_{RSM} = \text{rated}$ (see 1.3); $T_A = \text{room ambient}$ as defined in 4.5 of MIL-STD-750. |
| 4 | 1037 | $I_O = I_{O2}$ rated (see 1.3.2 and 4.3.1); $V_R = \text{rated}$ V_{RWM} (see 1.3.2 and 4.3.1); $f = 60$ Hz for a minimum of 2,000 cycles. $T_L \Rightarrow +55^{\circ}\text{C}$ at .375 inch. |
| 5 | 1027 | $I_O \geq I_{O2}$ rated minimum (see 1.3.2); $V_R = 0$; $f = 60$ Hz, $T_A = +150^{\circ}\text{C}$ minimum. Adjust T_A or I_O to achieve an average $T_J \geq +250^{\circ}\text{C}$. |
| 6 | 3101 or 4081 | See 4.5.1 and figure 8; maximum $R_{\theta JL}$ shall be as specified on table IV herein. |

4.4.2.2 Group B inspection, table VIb (JAN, JANTX, and JANTXV of MIL-PRF-19500).

| Subgroup | Method | Condition |
|----------|--------|--|
| 2 | 4066 | $I_{FSM} = \text{rated}$ (see 1.3); 10 surges of 8.3 ms each at 1 minute intervals, superimposed on $I_O = I_{O2}$ rated (see 1.3); $V_{RSM} = \text{rated}$ (see 1.3). $T_A = +25^{\circ}\text{C}$. |
| 3 | 1027 | $f = 60$ Hz; $V_R = V_{RWM}$ rated (see 1.3.2 and 4.3.1) $T_A = \text{room ambient}$ as defined in 4.5 of MIL-STD-750. Adjust I_O to achieve $T_J = 150^{\circ}\text{C}$ min. T_J max shall not exceed 200°C . |
| 5 | | Not applicable. |
| 6 | 1032 | $T_A = +175^{\circ}\text{C}$. |

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with the applicable inspections of table I, group A, subgroup 2 herein except $Z_{\theta JX}$ need not to be performed. See 4.5.2 for delta limits (JANS only).

| Subgroup | Method | Condition |
|----------|--------|---|
| 2 | 2036 | NOTE: Not applicable for US types. Tension: condition A, 4 pounds - 1N5802, 1N5804, 1N5806 5 pounds - 1N5807, 1N5809, 1N5811 Fatigue: Condition E, 2 pounds. |
| 3 | | Not applicable. |
| 6 | 1026 | $I_O = I_{O2}$ rated; $f = 60$ Hz; $V_R = V_{RWM}$ rated (see 1.3.2 and 4.3.1). |

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables as follows.

4.5.1 Thermal resistance. Thermal resistance shall be measured in accordance with MIL-STD-750, method 3101 or 4081. Read and record data in accordance with group E herein shall be included in the qualification report. Forced moving air or draft shall not be permitted across the device during test. The maximum limit for $R_{\theta JL}$ or $R_{\theta JEC}$ under these test conditions shall be as specified in 1.3.2. The following conditions shall apply:

1N5802, 1N5804, 1N5806

1N5807, 1N5809, 1N5811

$I_H = 2.0$ A dc minimum

2.0 A dc minimum

$I_M = 10$ mA

10 mA

$t_{MD} = 250$ μ s maximum

250 μ s maximum

The device shall be allowed to reach thermal equilibrium at current I_H before the measurement shall be made.

Lead spacing: $L = .375$ inch (9.52 mm) for leaded devices

$L = 0$ (endcap mount) for -US devices.

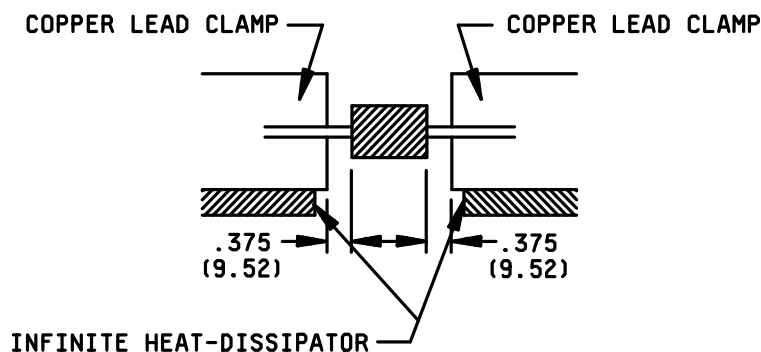


FIGURE 9. Mounting arrangement.

4.5.2 Delta Requirements. Delta requirements shall be as specified below:

| Step | Inspection | MIL-STD-750 | | Symbol | Limit | Unit |
|------|---|-------------|---|-----------------|--|------|
| | | Method | Conditions | | | |
| 1 | Forward voltage 1N5802,1N5804,1N5806 1N5807,1N5809,1N5811 | 4011 | Duty cycle ≤ 2 percent (pulsed); $t_p = 8.3$ ms (max) $I_{FM} = 1.0$ A(pk) $I_{FM} = 4.0$ A(pk) | ΔV_{F1} | ± 50 mV dc change from of initial value | |
| 2 | Reverse current 1N5802,1N5802US 1N5804,1N5804US 1N5806,1N5806US 1N5807,1N5807US 1N5809,1N5809US 1N5811,1N5811US | 4016 | DC method $V_R = 50$ V dc $V_R = 100$ V dc $V_R = 150$ V dc $V_R = 50$ V dc $V_R = 100$ V dc $V_R = 150$ V dc | ΔI_{R1} | 100% or ± 150 nA dc change from initial reading, whichever is greater. 100% or ± 500 nA dc change from initial reading, whichever is greater. | |

1/ Devices which exceed the group A limits for this test shall not be accepted.

TABLE I. Group A inspection.

| Inspection <u>1/</u> | MIL-STD-750 | | Symbol | Limit | | Unit |
|-----------------------------------|-------------|---|-----------------|-------|-------|------------|
| | Method | Conditions | | Min | Max | |
| <u>Subgroup 1</u> | | | | | | |
| Visual and mechanical Examination | 2071 | | | | | |
| <u>Subgroup 2</u> | | | | | | |
| Thermal impedance <u>2/</u> | 3101 | see 4.5.3 | $Z_{\theta JX}$ | | | |
| 1N5802, 1N5802US | | | | | 4.5 | °C/W |
| 1N5804, 1N5804US | | | | | | |
| 1N5806, 1N5806US | | | | | 1.5 | °C/W |
| 1N5807, 1N5807US | | | | | | |
| 1N5809, 1N5809US | | | | | | |
| 1N5811, 1N5811US | | | | | | |
| Forward voltage | 4011 | Duty cycle \leq 2 percent (pulsed); $t_p = 8.3$ ms (max) $I_{FM} = 1.0$ A(pk) | V_{FM1} | | 0.875 | V (pk) |
| 1N5802, 1N5802US | | | | | | |
| 1N5804, 1N5804US | | | | | | |
| 1N5806, 1N5806US | | | | | | |
| 1N5807, 1N5807US | | $I_{FM} = 4.0$ A(pk) | | | | |
| 1N5809, 1N5809US | | | | | | |
| 1N5811, 1N5811US | | | | | | |
| Forward voltage | 4011 | Duty cycle \leq 2 percent (pulsed); $t_p = 8.3$ ms (max) $I_{FM} = 2.5$ A(pk) | V_{FM2} | | 0.975 | V (pk) |
| 1N5802, 1N5802US | | | | | | |
| 1N5804, 1N5804US | | | | | | |
| 1N5806, 1N5806US | | | | | | |
| 1N5807, 1N5807US | | $I_{FM} = 6.0$ A(pk) | | | | |
| 1N5809, 1N5809US | | | | | | |
| 1N5811, 1N5811US | | | | | | |
| Reverse current | 4016 | DC method | I_{R1} | | | |
| 1N5802, 1N5802US | | $V_R = 50$ V dc | | | 1.0 | μ A dc |
| 1N5804, 1N5804US | | $V_R = 100$ V dc | | | 1.0 | μ A dc |
| 1N5806, 1N5806US | | $V_R = 150$ V dc | | | 1.0 | μ A dc |
| 1N5807, 1N5807US | | $V_R = 50$ V dc | | | 5.0 | μ A dc |
| 1N5809, 1N5809US | | $V_R = 100$ V dc | | | 5.0 | μ A dc |
| 1N5811, 1N5811US | | $V_R = 150$ V dc | | | 5.0 | μ A dc |
| Breakdown voltage | 4021 | $I_{(BR)} = 100$ μ A dc | $V_{(BR)1}$ | | | |
| 1N5802, 1N5802US | | | | 60 | | V dc |
| 1N5807, 1N5807US | | | | | | |
| 1N5804, 1N5804US | | | | 110 | | V dc |
| 1N5809, 1N5809US | | | | | | |
| 1N5806, 1N5806US | | | | 160 | | V dc |
| 1N5811, 1N5811US | | | | | | |

See footnotes at end of table.

TABLE I. Group A inspection.

| Inspection <u>1/</u> | MIL-STD-750 | | Symbol | Limit | | Unit |
|-----------------------------|-------------|--|--------------------|-------|-------|--------|
| | Method | Conditions | | Min | Max | |
| <u>Subgroup 3</u> | | | | | | |
| High temperature operation: | | T _A = +100°C | | | | |
| Reverse current | | DC method | I _{R2} | | | |
| 1N5802, 1N5802US | | V _R = 50 V dc | | | 50 | μA dc |
| 1N5804, 1N5804US | | V _R = 100 V dc | | | 50 | μA dc |
| 1N5806, 1N5806US | | V _R = 150 V dc | | | 50 | μA dc |
| 1N5807, 1N5807US | | V _R = 50 V dc | | | 150 | μA dc |
| 1N5809, 1N5809US | | V _R = 100 V dc | | | 150 | μA dc |
| 1N5811, 1N5811US | | V _R = 150 V dc | | | 150 | μA dc |
| Forward voltage | 4011 | Duty cycle ≤ 2 percent (pulsed); t _p = 8.3 ms (max) I _{FM} = 1.0 A(pk) | V _{FM3} | | 0.800 | V (pk) |
| 1N5802, 1N5802US | | | | | | |
| 1N5804, 1N5804US | | | | | | |
| 1N5806, 1N5806US | | | | | | |
| 1N5807, 1N5807US | | I _{FM} = 4.0 A(pk) | | | | |
| 1N5809, 1N5809US | | | | | | |
| 1N5811, 1N5811US | | | | | | |
| Low-temperature operation: | | T _A = -65°C | | | | |
| Forward voltage | 4011 | Duty cycle ≤ 2 percent (pulsed); t _p = 8.3 ms (max) I _{FM} = 1.0 A(pk) | V _{FM4} | | 1.075 | V (pk) |
| 1N5802, 1N5802US | | | | | | |
| 1N5804, 1N5804US | | | | | | |
| 1N5806, 1N5806US | | | | | | |
| 1N5807, 1N5807US | | I _{FM} = 4.0 A(pk) | | | | |
| 1N5809, 1N5809US | | | | | | |
| 1N5811, 1N5811US | | | | | | |
| Breakdown voltage | 4021 | I _(BR) = 100 μA dc | V _{(BR)2} | | | |
| 1N5802, 1N5802US | | | | 60 | | V dc |
| 1N5807, 1N5807US | | | | | | |
| 1N5804, 1N5804US | | | | 100 | | V dc |
| 1N5809, 1N5809US | | | | | | |
| 1N5806, 1N5806US | | | | 150 | | V dc |
| 1N5811, 1N5811US | | | | | | |
| <u>Subgroup 4</u> | | | | | | |
| Reverse recovery time | 4026 | Condition B | t _{rr} | | | |
| 1N5802, 1N5802US | | I _F = I _R = 0.5 A | | | 25 | ns |
| 1N5804, 1N5804US | | I _{RM} (REC) = 0.5 A(pk) | | | | |
| 1N5806, 1N5806US | | di/dt = 65 A/μs (min) | | | | |
| 1N5807, 1N5807US | | I _F = I _R = 1.0 A | | | 30 | ns |
| 1N5809, 1N5809US | | I _{RM} (REC) = 0.1 A(pk) | | | | |
| 1N5811, 1N5811US | | di/dt = 100 A/μs (min) | | | | |

See footnotes at end of table.

TABLE I. Group A inspection.

| Inspection <u>1/</u> | MIL-STD-750 | | Symbol | Limit | | Unit |
|--|-------------|---|-----------|-------|-----|--------|
| | Method | Conditions | | Min | Max | |
| <u>Subgroup 4</u> – continued | | | | | | |
| Capacitance | 4001 | $V_R = 10 \text{ V}$; $f = 1 \text{ Mhz}$; $V_{\text{sig}} = 50 \text{ mV (p-p)}$ | C_J | | 25 | pF |
| 1N5802, 1N5802US 1N5804, 1N5804US 1N5806, 1N5806US | | | | | | |
| 1N5807, 1N5807US 1N5809, 1N5809US 1N5811, 1N5811US | | | | | 60 | pF |
| Forward recovery voltage | 4026 | $t_r = 8 \text{ ns}$ $I_{FM} = 250 \text{ mA}$ | V_{FRM} | | 2.2 | V (pk) |
| 1N5802, 1N5802US 1N5804, 1N5804US 1N5806, 1N5806US | | | | | | |
| 1N5807, 1N5807US 1N5809, 1N5809US 1N5811, 1N5811US | | $I_{FM} = 500 \text{ mA}$ | | | | |
| Forward recovery time | 4026 | $t_p \geq 20 \text{ ns}$, $t_r = 8 \text{ ns}$, the test is measured at $V_{FR} = 1.1 \times V_F$ $I_{FM} = 250 \text{ mA}$ | t_{fr} | | 15 | ns |
| 1N5802, 1N5802US 1N5804, 1N5804US 1N5806, 1N5806US | | | | | | |
| 1N5807, 1N5807US 1N5809, 1N5809US 1N5811, 1N5811US | | $I_{FM} = 500 \text{ mA}$ | | | | |
| <u>Subgroup 5, 6, 7</u> | | | | | | |
| Not applicable | | | | | | |

1/ For sampling plan, see MIL-PRF-19500.2/ Not applicable to JANHC and JANKC devices.

TABLE II. Group E inspection (all quality levels) for qualification only.

| Inspection | MIL-STD-750 | | Sampling plan |
|--------------------------------------|--------------|--|---------------------|
| | Method | Conditions | |
| <u>Subgroup 1</u> | | | 32 devices c = 0 |
| Thermal shock (glass strain) | 1056 | 500 cycles; condition A | |
| Hermetic seal | 1071 | See table I, group A, subgroup 2, except $Z_{\theta JX}$ need not to be performed. | |
| Electrical measurement | | | |
| <u>Subgroup 2</u> | | | 32 devices c = 0 |
| Blocking life | 1048 | t = 1,000 hours; $T_A = +150^{\circ}\text{C}$; V_R DC = 80 - 85 percent rated V_{RWM} (see 1.3.2) | |
| Electrical measurement | | See table I, group A, subgroup 2, except $Z_{\theta JX}$ need not to be performed. | |
| <u>Subgroup 3</u> | | | |
| Not applicable | | | |
| <u>Subgroup 4</u> | | | 22 devices c = 0 |
| Thermal resistance, junction to lead | 3101 or 4081 | See 4.5.1 | |

4.5.3 Thermal impedance. Thermal impedance $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3101. The maximum limit for $Z_{\theta JX}$ in screening (table IV of MIL-PRF-19500) shall be derived by each vendor by means of Statistical Process Control and applied in screening of all subsequent lots. This limit shall not exceed the group A, subgroup 2 limit. The following conditions shall apply:

- $I_H = 5 \text{ A}$ minimum.
- $t_H = 10 \text{ ms}$.
- $I_M = 1 \text{ mA}$ to 10 mA .
- $t_{MD} = 100 \text{ }\mu\text{s}$ maximum.

4.5.3.1 For initial qualification and requalification. Read and record data ($Z_{\theta JX}$) shall be supplied to the qualifying activity on one lot (random sample of 500 devices minimum) prior to shipment. Twenty-two samples shall be serialized and provided to the qualifying activity for test correlation.

4.5.4 Scope-display evaluation. The reverse breakdown characteristics shall be viewed on an oscilloscope with display calibration factors of 50 to $100 \text{ }\mu\text{A}$ per division and 20 to 50 V per division. Reverse current over the knee shall be at $500 \text{ }\mu\text{A}$ minimum. Any discontinuity or dynamic instability of the trace shall be cause for rejection.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2 Marking. Unless otherwise specified (see 6.2), marking shall be in accordance with MIL-STD-129.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Issue of DODISS to be cited in the solicitation.
- b. Lead finish as specified (see 3.3.2).
- c. Product assurance level, type designator, and for die acquisition, the JANHC and JANKC identification (see figures 3 through 8)

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Columbus, DSCC-VQE, Columbus, OH 43216.

6.4 Suppliers of die. The qualified die suppliers with the applicable letter version (example; JANHCA1N5802) will be identified on the QPL.

| JANC ordering information | | | | | | |
|---------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| PIN | Manufacturer | | | | | |
| | 14552 | 12969 | 12969 | 12969 | 33178 | |
| 1N5802 | JANHCA1N5802 JANKCA1N5802 | JANHCB1N5802 JANKCB1N5802 | JANHCC1N5802 JANKCC1N5802 | JANHCD1N5802 JANKCD1N5802 | JANHCE1N5802 JANKCE1N5802 | JANHCF1N5802 JANKCF1N5802 |
| 1N5804 | JANHCA1N5804 JANKCA1N5804 | JANHCB1N5804 JANKCB1N5804 | JANHCC1N5804 JANKCC1N5804 | JANHCD1N5804 JANKCD1N5804 | JANHCE1N5804 JANKCE1N5804 | JANHCF1N5804 JANKCF1N5804 |
| 1N5806 | JANHCA1N5806 JANKCA1N5806 | JANHCB1N5806 JANKCB1N5806 | JANHCC1N5806 JANKCC1N5806 | JANHCD1N5806 JANKCD1N5806 | JANHCE1N5806 JANKCE1N5806 | JANHCF1N5906 JANKCF1N5806 |
| 1N5807 | JANHCA1N5807 JANKCA1N5807 | JANHCB1N5807 JANKCB1N5807 | JANHCC1N5807 JANKCC1N5807 | JANHCD1N5807 JANKCD1N5807 | JANHCE1N5807 JANKCE1N5807 | JANHCF1N5807 JANKCF1N5807 |
| 1N5809 | JANHCA1N5809 JANKCA1N5809 | JANHCB1N5809 JANKCB1N5809 | JANHCC1N5809 JANKCC1N5809 | JANHCD1N5809 JANKCD1N5809 | JANHCE1N5809 JANKCE1N5809 | JANHCF1N5809 JANKCF1N5809 |
| 1N5811 | JANHCA1N5811 JANKCA1N5811 | JANHCB1N5811 JANKCB1N5811 | JANHCC1N5811 JANKCC1N5811 | JANHCD1N5811 JANKCD1N5811 | JANHCE1N5811 JANKCE1N5811 | JANHCF1N5811 JANKCF1N5811 |

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:
 Army - CR
 Navy - EC
 Air Force - 85
 NASA - NA

Preparing activity:
 DLA - CC
 (Project 5961-1913)

Review activities:
 Army - AR, AV, MI, SM
 Navy - AS, CG, MC
 Air Force - 19, 99

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| 4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.) | | | |
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